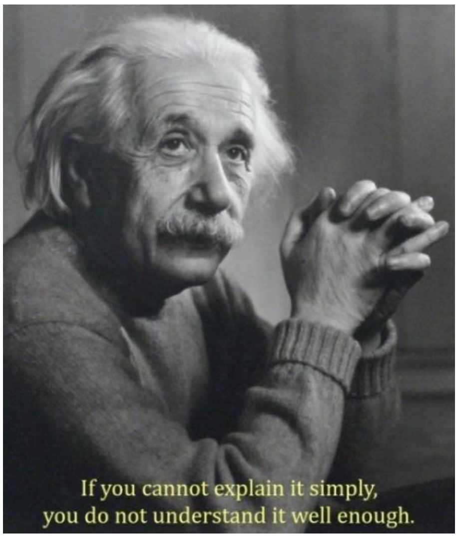
Gravitational potential energy:	$V - V_\infty = -\frac{GMm}{r}$			[1]
gravitational potential:	$U = \frac{V-V_\infty}{m} = \frac{-GM}{r}$			[2]
Escape velocity:	$v_{\text{esc}} = \sqrt{\frac{2GM}{r}}$	$\Leftrightarrow v_{\text{esc}}^2 = -2U$	$\therefore \frac{v_{\text{esc}}^2}{c^2} = \frac{-2U}{c^2} = \frac{2GM}{rc^2}$	[3]
Kinetic energy of free fall:	$T = \frac{1}{2}mv_{\text{ff}}^2$			[4]
free fall from ∞, starting with:	$v_{\text{ff@}\infty} = 0 \therefore T_\infty = 0$			[5]
specific *kinetic energy*:	$S = \frac{T}{m} = \frac{1}{2}v_{\text{ff}}^2$			[6]
Free fall *velocity*:		$\therefore v_{\text{ff}}^2 = 2S$	$\therefore \frac{v_{\text{ff}}^2}{c^2} = \frac{2S}{c^2}$	[7]
Conservation of *energy*:	$\boldsymbol{T = V_\infty - V}$	$\therefore S = -U$	$\therefore v_{\text{ff}}^2 = v_{\text{esc}}^2$	[8]
therefore (obviously):	$\boldsymbol{\frac{2S}{c^2} = \frac{-2U}{c^2}}$			[9]
This renders:	$\sqrt{1-\frac{2S}{c^2}} = \sqrt{1+\frac{2U}{c^2}}$			[10]
therefore:	$\sqrt{1-\frac{v_{\text{ff}}^2}{c^2}} = \sqrt{1-\frac{v_{\text{esc}}^2}{c^2}} = \sqrt{1-\frac{2GM}{rc^2}}$			[11]
From SR, we have:	$\sqrt{1-\frac{v_{\text{ff}}^2}{c^2}} = \sqrt{1-\beta_{\text{ff}}^2} = \frac{1}{\gamma}$			[12]
and from GR:	$\sqrt{1-\frac{v_{\text{esc}}^2}{c^2}} = \sqrt{1-\beta_{\text{esc}}^2} = \sqrt{1-\frac{2GM}{rc^2}} = \sqrt{1-\frac{r_S}{r}}$			[13]
Yielding (with $\beta_{\text{ff}} = -\beta_{\text{esc}}$):	$\boldsymbol{\frac{1}{\gamma} = \sqrt{1-\frac{r_S}{r}}}$	and	$\boldsymbol{\beta_{\text{ff}}^2 = \frac{r_S}{r}}$	[14]

The reciprocal *Lorentz factor* of a freely falling body (which has *accelerated* to its free fall velocity) equals the *"Schwarzschild factor"* that arises from the *gravitational field* at its current location. This simply follows from the **conservation of *energy***.

Potential energy is due to *gravitation* & *acceleration* turns it into *kinetic energy*.

Einstein's equivalence principle: a *gravitational field* and *acceleration* are indistinguishable.

Conservation of *energy* and Einstein's equivalence principle apparently are the very same.



Is this a new insight?
Google renders not much when searching for:
equivalence principle conservation energy
I found: https://arxiv.org/abs/gr-qc/0409121
(as of 2021)

He actually said (to Louis de Broglie): *All physical theories, their mathematical expression apart, ought to lend themselves to so simple a description that even a child could understand them.*

